

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.	:	10/522,273	Confirmation No. 8782
Applicant	:	Yuichiro Shindo et al.	
371 Filed	:	January 25, 2005	
Art Unit	:	1793	
Examiner	:	Edward M. Johnson	
Customer No.	:	00270	
Title	:	HIGH PURITY COPPER SULFATE AND METHOD FOR PRODUCTION THEREOF	

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Commissioner for Patents
P.O. Box 1450
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APPEAL BRIEF

Sir:

This is an Appeal Brief submitted in accordance with 37 CFR §41.37 within two months from the filing of August 16, 2010 of a Notice of Appeal. The appeal is taken from a FINAL rejection issued on May 18, 2010 for the above identified application.

Real Party in Interest

The real party in interest is JX Nippon Mining & Metals Corporation.

The named inventors assigned their rights in the application to Nikko Materials Co., Ltd. via assignment recorded in the U.S. Patent and Trademark Office on July 5, 2005, reel/frame: 016468/0857. A name change document recording a name change from Nikko Materials Co., Ltd. to Nippon Mining & Metals Co., Ltd. was recorded in the U.S. Patent and Trademark Office on November 28, 2006, reel/frame: 018557/0853. More recently, Nippon Mining & Metals Co., Ltd. has been merged into Nippon Mining Holdings, Inc. (merger document recorded in the U.S. Patent and Trademark Office on October 8, 2010, reel/frame: 025115/0062) and thereafter, the name of Nippon Mining Holdings, Inc. was changed to JX Nippon Mining & Metals Corporation (name change document recorded in the U.S. Patent and Trademark Office on October 12, 2010, reel/frame: 025123/0358).

Related Appeals and Interferences

There are no known prior or pending related appeals, interferences or judicial proceedings.

Status of Claims

Elected claims 20-32, 35 and 36 are rejected.

Elected dependent claims 33 and 34 are objected to as depending from a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims.

Non-elected, method claims 1 and 2 are withdrawn.

Claims 3-19 are canceled.

Appellant appeals the final rejection of claims 20-32, 35 and 36.

Status of Amendments

No amendment has been filed by the Appellant or entered by the Examiner in the above referenced application since the Final Office Action dated May 18, 2010.

Summary of Claimed Subject Matter

Independent claim 20 is directed to copper sulfate of high purity (see page 2, lines 14-18) prepared by a process comprising the steps of dissolving copper sulfate crystals in purified water (see page 4, lines 20-21), performing evaporative concentration thereto (see page 5, lines 3-5), removing the crystals precipitated initially (see page 5, lines 10-26), performing further evaporative concentration to effect crystallization (see page 6, lines 2-6), subjecting this to filtration (see page 6, lines 6-7) to obtain high purity copper sulfate, and performing desiccation thereto (page 6, lines 8-17). A purity of the copper sulfate is 99.99wt% or higher (see page 6,

lines 18-20) and a content of transition metals, such as Fe, Cr, and Ni, is 3 wtppm or less (see page 3, lines 9-10, see page 9, lines 10-15, and see page 10, Table 4-1).

Independent claim 24 is directed to copper sulfate having a purity of 99.99wt% or higher (see page 6, lines 18-20).

Independent claim 32 is directed to an electrolytic solution for electroplating copper to form a circuit or wiring of a semiconductor device (see page 1, lines 22-25; see page 6, line 21, to page 7, line 3; and see page 9, line 16, to page 11, line 17). The electrolytic solution comprises copper sulfate having a purity of 99.99wt% (4N) or higher (see page 6, lines 18-20). The copper sulfate has a content of transition metals of 3wtppm or less (see page 3, lines 9-10, see page 9, lines 10-15, and see page 10, Table 4-1), a content of Ag and Cl of 1wtppm or less, respectively (see page 6, lines 21-24), a content of alkali metals and alkaline earth metals of 1 wtppm or less, respectively (see page 6, lines 25-30) and a content of a Si containing oxide of 10wtppm or less based on Si conversion (page 7, lines 1-3).

None of the claims includes a means-plus or step-plus function permitted by 35 USC §112, sixth paragraph.

Grounds of Rejection to be Reviewed on Appeal

Claims 20-32, 35 and 36 stand rejected under 35 USC §102(b) as being anticipated by or, in the alternative, under 35 USC §103(a) as being obvious over Japanese Patent Application Publication No. JP 05-262532 A of Okawa (hereinafter referred to as “JP ‘532”).

Claims 20-32, 35 and 36 stand rejected under 35 USC §102(b) as being anticipated by or, in the alternative, under 35 USC §103(a) as being obvious over Japanese Patent Application Publication No. JP 47-040634 (hereinafter referred to as “JP ‘634”).

Claims 20-32, 35 and 36 stand rejected under 35 USC §102(b) as being anticipated by or, in the alternative, under 35 USC §103(a) as being obvious over U.S. Patent No. 5,059,403 issued to Chen (hereinafter referred to as “Chen”).

Argument

I. §102(b) Anticipation Rejection of Claims 20-32, 35 and 36 based on JP ‘532

A claim of a patent application can be anticipated under 35 USC §102 only if each and every element is found described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim, and the elements identified by the reference must be arranged as required by the claim.

Thus, if a prior art reference relied on in a rejection made under 35 USC §102 does not contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim, the anticipation rejection is improper and should be removed.

JP ‘532 discloses a copper sulfate solution and a simple, low-cost method of manufacturing a copper sulfate solution “directly from metallic copper powder”.

However, JP ‘532 fails to disclose copper sulfate having:

a purity of 99.99wt% or higher (claims 20, 24 and 32);

a content of transition metals, such as Fe, Cr, and Ni, of 3 wtppm or less (claims 20, 25 and 32);

- a content of Ag and Cl of 1wtppm or less, respectively (claims 21, 26, 29 and 32);
- a content of alkali metals, such as Na and K, and alkaline earth metals, such as Ca and Mg, of 1 wtppm or less, respectively (claims 22, 27, 30 and 32);
- a content of an Si containing oxide of 10wtppm or less based on Si conversion (claims 23, 28, 31 and 32); and
- a content of sodium (Na) of 0.3wtppm or 0.4wtppm (claims 35 and 36).

Accordingly, since JP '532 does not contain every element and limitation recited in the above referenced claims of the present application in as complete detail as is contained in the above referenced claims, Appellant respectfully submits that the anticipation rejection under 35 USC §102(b) based on JP '532 is in error and should be reversed and withdrawn.

II. §103(a) Obviousness Rejection of Claims 20-32, 35 and 36 based on JP '532

As stated above, JP '532 discloses a copper sulfate solution and a simple, low-cost method of manufacturing a copper sulfate solution "directly from metallic copper powder" without going through or producing copper oxide powder. The disclosure provided by JP '532 emphasizes low cost, short manufacturing time, and simplicity -- not purity. In fact, JP '532 fails to reference any purity level or disclose any steps with respect to reducing impurities.

JP '523 provides a disclosure to one of ordinary skill in the art to perform the following process steps: introduce large amounts of fine air bubbles in a suspension of metallic copper powder and add sulfuric acid while maintaining the solution between 65°C and 85°C thereby directly oxidizing and melting metallic copper. Steps relating to the preparation of a copper oxide powder are avoided. None of the steps disclosed by JP '523 relate to purification.

The description of the Example (Experiment No. 1) in JP '523 is as follows: 920L of “industrial water” was placed in a melting unit comprising a bath with a jacket having a volume of 1.5m³ and an air type agitator, 125Kg of metallic copper powder having a grain size of 40 mesh to 60 mesh was placed therein and suspended, rotation of the agitator was set to 125rpm, and 225Kg of 98% concentrated sulfuric acid was added over a period of approximately one hour. The liquid temperature was maintained at 70°C during this period. Agitation was continued for an additional two hours. The inversion rate to copper sulfate was 99.2%.

“Experiment No. 2” of JP '523 is described as follows: metallic copper powder was placed in a solution containing 18g/L of arsenic, 30g/L of copper, and 90g/L of sulfuric acid and suspended.

JP '523 teaches to one of ordinary skill in the art the step of “air blowing” to oxidize and melt the metallic copper. The introduction of fine air bubbles into the suspension will necessarily including the addition of dust and like air-borne particles and impurities to become mixed into the suspension. Moreover, in “Experiment No. 1” of the Examples of JP '523, “industrial” water is used to form the suspension, not “purified” water. Again, it is evident that no consideration is given to the purity of the “industrial” water or the impurities added into the suspension with the “industrial” water. Thus, further impurities will necessarily be added into the suspension with no attempt disclosed by JP '523 to reduce such impurities. Still further, “Experiment No. 2” intentionally includes an amount of arsenic. The inclusion of arsenic as an impurity is thereby unavoidable.

It should be understood that copper sulfate has many end uses, and purity level or impurity content is not even a concern for the vast majority of end uses. According to the present

invention, the copper sulfate is being used for an electrolytic solution for electroplating copper to form a circuit or wiring of a semiconductor device. The size of semiconductor devices are continually being miniaturized and as the wiring and circuits become smaller, the presence of impurities, even at extremely low levels (i.e. 100wtppm or less), becomes a problem and causes the semiconductor devices to be defective. Thus, the present invention advances the state of the art with respect to electrolytic solutions for miniaturized semiconductor manufacture. A purity of 99.99wt% converts to 100wtppm or less of impurities.

JP '523 fails to disclose copper sulfate having a specified purity level and takes no steps to reduce impurities. The disclosed method is with respect to an inexpensive and quick-and-dirty process for producing a copper sulfate solution directly from metallic copper powder. One of ordinary skill in the art is provided with no motivation and has no common sense basis to reasonably expect the use of the inexpensive and quick-and-dirty process of JP '523 will yield copper sulfate having: 4N purity (no more than 100wtppm of impurities); a content of transition metals of 3 wtppm or less; a content of Ag and Cl of 1wtppm or less, respectively; a content of alkali metals and alkaline earth metals of 1 wtppm or less, respectively; and/or a content of an Si containing oxide of 10wtppm or less based on Si conversion.

In addition, one of ordinary skill in the art will be well aware that JP '523 fails to disclose copper sulfate useful as an electrolytic solution for electroplating copper to form a circuit or wiring of a semiconductor device that will not be subject to defects caused by impurities.

JP '523 actually teaches away from the claimed subject matter of the present application in that it discloses no steps to reduce impurities, provides no reason to reduce impurities, and

intentionally increases impurity content by intentionally injecting air bubbles and dust, industrial water, and arsenic into the solution.

For the above reasons, Appellant respectfully submits that to interpret the disclosure of JP '523 as teaching, enabling the manufacture of, providing the motivation for, or rendering obvious copper sulfate having the qualities required by the claims of the present application is an error. One of ordinary skill in the art cannot achieve or arrive at the present invention based on the teachings of JP '523. Accordingly, Appellant respectfully submits that the obviousness rejection under 35 USC §103(a) of the claims of the present application is in error and should be reversed and withdrawn.

III. §102(b) Anticipation Rejection of Claims 20-32, 35 and 36 based on JP '634

A claim of a patent application can be anticipated under 35 USC §102 only if each and every element is found described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim, and the elements identified by the reference must be arranged as required by the claim.

Thus, if a prior art reference relied on in a rejection made under 35 USC §102 does not contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim, the anticipation rejection is improper and should be removed.

JP '634 discloses a copper sulfate for use as an agricultural chemical (Bordeaux mixture), antiseptic agent (railroad crosstie, utility pole, starch for spinning, fishing net), Bemberg rayon, iodine production, ceramic material, and pigment. JP '634 acknowledges that Fe, Zn and Pb are contained in the raw material copper concentrate and discloses a copper sulfate of maximum

purity of 99.3%. Thus, the impurity content is 0.7% which converts to 7,000wtppm of impurities. Of course, the presence of this amount of impurities will have no impact in agricultural chemicals, antiseptic agents for railroad crossties, utility poles, starch for spinning, and fishing nets, Bemberg rayon, iodine production, ceramic material, and pigment. The same is not true for semiconductor manufacture.

Appellant respectfully submits that JP '634 fails to disclose copper sulfate having:

a purity of 99.99wt% or higher (claims 20, 24 and 32);

a content of transition metals, such as Fe, Cr, and Ni, of 3 wtppm or less (claims 20, 25 and 32);

a content of Ag and Cl of 1wtppm or less, respectively (claims 21, 26, 29 and 32);

a content of alkali metals, such as Na and K, and alkaline earth metals, such as Ca and Mg, of 1 wtppm or less, respectively (claims 22, 27, 30 and 32);

a content of an Si containing oxide of 10wtppm or less based on Si conversion (claims 23, 28, 31 and 32); and

a content of sodium (Na) of 0.3wtppm or 0.4wtppm (claims 35 and 36).

Accordingly, since JP '634 does not contain every element and limitation recited in the above referenced claims of the present application in as complete detail as is contained in the above referenced claims, Appellant respectfully submits that the anticipation rejection under 35 USC §102(b) is in error and should be reversed and withdrawn.

IV. §103(a) Obviousness Rejection of Claims 20-32, 35 and 36 based on JP '634

JP '634 discloses that it is possible to economically sulfate the copper content in copper sulfate ore by fluidizing and roasting the copper sulfide ore. Moreover, as the production method

of copper sulfate, JP '634 provides the following disclosure: a method of producing copper sulfate, comprising: (1) a first step of sulfating and roasting copper sulfide ore, (2) a second step of extracting copper sulfate under calcination as a copper sulfate tetraamine solution with a diluted aqueous ammonia and separating it from residue, (3) a third step of increasing the ammonia concentration in the obtained extraction liquid to precipitate crystals of copper sulfate tetraamine and separating them from the mother liquid, and (4) a fourth step of heating the obtained crystals to 400 to 800°C to obtain anhydrous copper sulfate.

The Example disclosed by JP '634 describes that the anhydrous copper sulfate contains 39.5% of copper and has a purity of 99.3% as the copper sulfate. The intended usage of copper sulfate prepared by JP '634 is as an agricultural chemical (Bordeaux mixture), antiseptic agent (railroad crosstie, utility pole, starch for spinning, fishing net), Bemberg rayon, iodine production, ceramic material, and pigment.

It should be understood that copper sulfate has many end uses, and impurity level is not necessarily a concern for most uses. According to the present invention, the copper sulfate is being used for an electrolytic solution for electroplating copper to form a circuit or wiring of a semiconductor device. This is not the use disclosed by JP '634. The size of semiconductor devices are continually being miniaturized and as the wiring and circuits become smaller, the presence of impurities, even at extremely low levels, becomes a problem and causes the semiconductor devices to be defective. Thus, the present invention advances the state of the art with respect to electrolytic solutions for semiconductor manufacture. A purity of 99.99wt% converts to 100wtppm of impurities or less.

JP '634 acknowledges that Fe, Zn and Pb are contained in the raw material copper concentrate and discloses a copper sulfate of maximum purity of 99.3%. Thus, the impurity content is 0.7% which converts to 7,000wtppm of impurities. Of course, the presence of this amount of impurities will have no impact in agricultural chemicals, antiseptic agents (for railroad crossties, utility poles, starch for spinning, fishing nets), Bemberg rayon, iodine production, ceramic material, and pigment. Further, it should be acknowledged that, as impurity content is reduced, it becomes progressively more difficult to continue to further reduce impurities. Thus, JP '634 fails to make obvious or provide a motivation to one of ordinary skill in the art a copper sulfate of purity greater than 99.3% and provides no motivation or teaching for enabling further reduction.

Appellants respectfully submit that JP '634 fails to disclose copper sulfate having a purity of 99.99% or higher or render such a copper sulfate necessary or obvious. JP '634 provides no recognition of the problems or solutions with respect to a copper sulfate plating solution as claimed in the present application.

Accordingly, Appellant respectfully submits that the claim limitations of the present application are critical and are not taught, suggested or disclosed to one of ordinary skill in the art by JP '634. One of ordinary skill in the art has no common sense basis to reasonably expect the use of the economical method of JP '634 will, can, or should yield copper sulfate having: 4N purity (no more than 100wtppm of impurities); a content of transition metals of 3 wtppm or less; a content of Ag and Cl of 1 wtppm or less, respectively; a content of alkali metals and alkaline earth metals of 1 wtppm or less, respectively; and/or a content of an Si containing oxide of 10wtppm or less based on Si conversion. In addition, JP '634 fails to disclose an electrolytic

solution for electroplating copper to form a circuit or wiring of a semiconductor device or the need for the above referenced qualities.

For the above reasons, Appellant respectfully submits that to interpret the disclosure of JP '634 as teaching, enabling the manufacture of, providing a motivation for, or rendering obvious copper sulfate as required by the claims of the present application is an error. Accordingly, Appellant respectfully submits that the obviousness rejection under 35 USC §103(a) is in error and should be reversed and withdrawn.

V. §102(b) Anticipation Rejection of Claims 22- 23, 27-28, 30, 32, 35 & 36 on Chen

A claim of a patent application can be anticipated under 35 USC §102 only if each and every element is found described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim, and the elements identified by the reference must be arranged as required by the claim.

Thus, if a prior art reference relied on in a rejection made under 35 USC §102 does not contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim, the anticipation rejection is improper and should be removed.

Chen discloses a copper sulfate having “purity >99.8%”. Chen fails to define an achievable upper limit of purity. The disclosed level of purity converts to an impurity content of as much as 2,000wtppm.

Chen requires 10 to 45% of “sodium hydroxide” to be “periodically” added into the solution. Accordingly, Chen provides no recognition of eliminating sodium (Na) as an impurity and intentionally adds sodium to the solution. Chen takes no steps to reduce sodium as an

impurity. Thus, Appellant respectfully submits that the copper sulfate of Chen will necessarily include more than 1wtppm of Na required by claims 22, 23, 27, 28, 30, 32, 35 and 36.

Accordingly, Appellant respectfully submits that Chen fails to disclose a content of alkali metals (which includes Na among other elements) of 1 wtppm or less. Of course, Chen also fails to disclose a content of sodium (Na) of 0.3wtppm or 0.4wtppm as required by claims 35 and 36.

Accordingly, since Chen does not contain every element and limitation recited in the above referenced claims of the present application in as complete detail as is contained in the above referenced claims, Appellant respectfully submits that the anticipation rejection under 35 USC §102(b) is in error and should be reversed and withdrawn with respect to claims 22, 23, 27, 28, 30, 32, 35 and 36.

VI. §102(b) Anticipation Rejection of Claims 20, 21, 24-26, 29 and 31 based on Chen

A claim of a patent application can be anticipated under 35 USC §102 only if each and every element is found described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim, and the elements identified by the reference must be arranged as required by the claim.

Thus, if a prior art reference relied on in a rejection made under 35 USC §102 does not contain every element recited in the claim in as complete detail as is contained in the claim and arranged as recited in the claim, the anticipation rejection is improper and should be removed.

Chen discloses a copper sulfate made from “waste copper-containing liquid”. Purity is referenced as “purity >99.8%”. An achievable upper limit of purity is not disclosed. The disclosed level of purity converts to an impurity content of as much as 2,000wtppm. Chen

requires 10 to 45% of “sodium hydroxide” to be “periodically” added into the solution. Accordingly, Chen provides no recognition of eliminating sodium (Na) as an impurity, intentionally adds sodium to the solution, and makes no attempt to remove sodium as an impurity.

Chen fails to disclose copper sulfate having:

a purity of 99.99wt% or higher (claims 20 and 24);

a content of transition metals, such as Fe, Cr, and Ni, of 3 wtppm or less (claims 20 and 25);

a content of Ag and Cl of 1wtppm or less, respectively (claims 21, 26 and 29); and

a content of a Si containing oxide of 10wtppm or less based on Si conversion (claim 31).

Appellant respectfully submits that the copper sulfate of Chen will include a large amount of Na which will prevent Chen from achieving 99.99wt% purity or reducing impurity content to 100wtppm. Also, the ability to achieve, or the disclosure of, 99.8% purity or purity slightly above this level does not necessarily disclose the claim limitation of 99.99wt% purity. There are practical limits with respect to any purification method. Chen discloses precipitating copper sulfate crystals from waste liquid and cleaning such crystals to eliminate impurities. However, Appellant respectfully submits that it is not possible to sufficiently eliminate impurities to achieve a 4N purity level merely by precipitation and cleaning. In the present invention, it is necessary to repeat concentration and recrystallization steps (with the initial crystals being removed to remove impurities) to achieve the desired level of purity (4N).

Accordingly, since Chen does not contain every element and limitation recited in the above referenced claims of the present application in as complete detail as is contained in the

above referenced claims, Appellant respectfully submits that the anticipation rejection under 35 USC §102(b) is in error and should be reversed and withdrawn with respect to claims 20, 21, 24-26, 29 and 31.

VII. §103(a) Obviousness Rejection of Claims 22-23, 27-28, 30, 32, 35 & 36 on Chen

The technology of Chen is characterized in collecting copper as copper sulfate from waste liquid having numerous impurities. Chen obtains a product by periodically neutralizing the solution with sodium hydroxide. Thus, there is no recognition by Chen of Na being an impurity or of eliminating Na as an impurity.

Further, unlike the present invention, Chen does not eliminate early precipitation of crystals. Thus, the impurities that could be eliminated by the foregoing treatment (treatment of eliminating the early precipitated crystals) remain in the solution of Chen and are not removed. Accordingly, Appellant submits that it is not obvious for one of ordinary skill in the art to produce copper sulfate meeting all the limitations required by the above referenced claims of the present application. Chen cannot achieve the same level of purity as that required by the claims of the present application and is only able to achieve a purity of 99.8% or slightly thereabove.

Appellant also submits that the copper sulfate of Chen will necessarily include more than 1 wtppm of Na because of the intentional introduction of sodium into the solution. Thus, with respect to the intentional addition of Na, Appellant respectfully submits that Chen teaches away from the present invention.

Accordingly, Appellant respectfully submits that Chen fails to make copper sulfate having a content of alkali metals (which includes Na among other elements) of 1 wtppm or less

obvious to one of ordinary skill in the art and fails to provide any motivation or common sense basis for providing same. Of course, Chen also fails to make obvious a content of sodium (Na) as low as 0.3wtppm or 0.4wtppm.

For the above reason, Appellant respectfully submits that to interpret the disclosure of Chen as teaching, enabling the manufacture of, providing a motivation for, or rendering obvious copper sulfate as required by claims 22, 23, 27, 28, 30, 32, 35 and 36 of the present application is an error. Appellant respectfully submits that the obviousness rejection under 35 USC §103(a) is in error and should be reversed and withdrawn.

VIII. §103(a) Obviousness Rejection of Claims 20, 21, 24-26, 29 and 31 based on Chen

The technology of Chen is characterized in collecting copper as copper sulfate from waste liquid having numerous impurities. Chen obtains a product by periodically neutralizing the solution with sodium hydroxide. Thus, there is no recognition by Chen of Na being an impurity or of eliminating Na as an impurity.

Further, unlike the present invention, Chen does not eliminate early precipitation of crystals. Thus, the impurities that could be eliminated by the foregoing treatment (treatment of eliminating the early precipitated crystals) remain in the solution of Chen and are not removed. Accordingly, Appellant submits that it is not obvious for one of ordinary skill in the art based on Chen to produce copper sulfate having 4N purity (no more than 100wtppm of impurities), a content of transition metals of 3 wtppm or less, a content of Ag and Cl of 1wtppm or less, respectively, and/or a content of an Si containing oxide of 10wtppm or less based on Si conversion.

Appellant respectfully submits that the copper sulfate of Chen will include a large amount of Na which will prevent Chen from achieving 99.99wt% purity or reducing impurity content to 100wtppm. Also, the ability to achieve, or the disclosure of, 99.8% purity or purity slightly above this level does not necessarily disclose the claim limitation of 99.99wt% purity. There are practical limits with respect to any purification method. Chen discloses precipitating copper sulfate crystals from waste liquid and merely cleaning such crystals to eliminate impurities. However, Appellant respectfully submits that it is not possible to sufficiently eliminate impurities to achieve a 4N purity level merely by precipitation and cleaning and this will be obvious to one of ordinary in the art. In the present invention, it is necessary to repeat concentration and recrystallization steps (removing initial crystals to remove impurities) to achieve a 4N level of purity or impurity content of 100wtppm or less.

Accordingly, Appellant respectfully submits that the claim limitations of the present application are critical and are not taught, suggested or disclosed to one of ordinary skill in the art by Chen. One of ordinary skill in the art has no common sense basis to reasonably expect the use of the method of Chen will or should yield copper sulfate having: 4N purity (no more than 100wtppm of impurities); a content of transition metals of 3 wtppm or less; a content of Ag and Cl of 1wtppm or less, respectively; and/or a content of an Si containing oxide of 10wtppm or less based on Si conversion. There is no suggestion or reason given by Chen for this reduction.

For the above reasons, Appellant respectfully submits that to interpret the disclosure of Chen as teaching, enabling the manufacture of, providing a motivation for, or rendering obvious copper sulfate as required by the claims of the present application is an error. Accordingly,

Appellant respectfully submits that the obviousness rejection under 35 USC §103(a) is in error and should be reversed and withdrawn.

Summary

For the reasons stated above, it is submitted that the final rejection of claims 20-32, 35 and 36 should be reversed.

Payment of \$540 for the required fee under 37 CFR §41.20(b)(2) is charged to our deposit account No. 08-3040. Please charge any deficiency in the fee submitted for this brief to our deposit account 08-3040.

Respectfully submitted,
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Enclosures:

(a) appendix with copy of claims on appeal

CLAIMS APPENDIX

COPY OF CLAIMS INVOLVED IN THE APPEAL

Claim 1 (withdrawn): A manufacturing method of the high purity copper sulfate according to claim 24, including the steps of dissolving copper sulfate crystals in purified water, performing evaporative concentration thereto, removing the crystals precipitated initially, performing further evaporative concentration to effect crystallization, subjecting this to filtration to obtain high purity copper sulfate, and performing desiccation thereto.

Claim 2 (withdrawn): A manufacturing method of high purity copper sulfate according to claim 1, wherein the initial pH of the solution in which the copper sulfate was dissolved in purified water is 2 to 4, and the pH of the solution after removing the crystals precipitated initially is 2 or less.

Claims 3-19 (canceled).

Claim 20 (previously presented): A high purity copper sulfate prepared by a process comprising the steps of dissolving copper sulfate crystals in purified water, performing evaporative concentration thereto, removing the crystals precipitated initially, performing further evaporative concentration to effect crystallization, subjecting this to filtration to obtain high purity copper sulfate, and performing desiccation thereto, wherein a purity of said copper sulfate

is 99.99wt% or higher and in which a content of transition metals, such as Fe, Cr, and Ni, is 3 wtppm or less.

Claim 21 (previously presented): High purity copper sulfate according to claim 20, wherein a content of Ag and Cl in said copper sulfate is 1 wtppm or less, respectively.

Claim 22 (previously presented): High purity copper sulfate according to claim 21, wherein a content of alkali metals, such as Na and K, and alkaline earth metals, such as Ca and Mg, in said copper sulfate is 1 wtppm or less, respectively.

Claim 23 (previously presented): High purity copper sulfate according to claim 22, wherein a content of an Si containing oxide in said copper sulfate is 10wtppm or less based on Si conversion.

Claim 24 (previously presented): A copper sulfate having a purity of 99.99wt% or higher.

Claim 25 (previously presented): A copper sulfate according to claim 24, wherein said copper sulfate has a content of transition metals, such as Fe, Cr, and Ni, of 3 wtppm or less.

Claim 26 (previously presented): A copper sulfate according to claim 25, wherein said copper sulfate has a content of Ag and Cl of 1 wtppm or less, respectively.

Claim 27 (previously presented): A copper sulfate according to claim 26, wherein said copper sulfate has a content of alkali metals, such as Na and K, and alkaline earth metals, such as Ca and Mg, of 1 wtppm or less, respectively.

Claim 28 (previously presented): A copper sulfate according to claim 27, wherein said copper sulfate has a content of an Si containing oxide of 10wtppm or less based on Si conversion.

Claim 29 (previously presented): A copper sulfate according to claim 24, wherein said copper sulfate has a content of Ag and Cl of 1wtppm or less, respectively.

Claim 30 (previously presented): A copper sulfate according to claim 24, wherein said copper sulfate has a content of alkali metals, such as Na and K, and alkaline earth metals, such as Ca and Mg, of 1 wtppm or less, respectively.

Claim 31 (previously presented): A copper sulfate according to claim 24, wherein said copper sulfate has a content of an Si containing oxide of 10wtppm or less based on Si conversion.

Claim 32 (previously presented): An electrolytic solution for electroplating copper to form a circuit or wiring of a semiconductor device, comprising:
copper sulfate having a purity of 99.99wt% (4N) or higher;

said copper sulfate having a content of transition metals of 3wtppm or less;
said copper sulfate having a content of Ag and Cl of 1wtppm or less, respectively;
said copper sulfate having a content of alkali metals and alkaline earth metals of 1
wtppm or less, respectively; and
said copper sulfate having a content of a Si containing oxide of 10wtppm or less
based on Si conversion.

Claim 33 (previously presented): An electrolytic solution according to claim 32, wherein
said copper sulfate has a content of nickel (Ni) of 1wtppm or less and wherein said copper sulfate
has a content of sodium (Na) of 0.3wtppm or 0.4wtppm.

Claim 34 (previously presented): An electrolytic solution according to claim 33, wherein
said copper sulfate has a content of nickel (Ni) of 0.2wtppm, and wherein said copper sulfate has
a purity of 99.999wt% (5N) or higher.

Claim 35 (previously presented): A copper sulfate according to claim 27, wherein said
copper sulfate has a content of sodium (Na) of 0.3wtppm or 0.4wtppm.

Claim 36 (previously presented): High purity copper sulfate according to claim 22,
wherein said copper sulfate has a content of sodium (Na) of 0.3wtppm or 0.4wtppm.

EVIDENCE APPENDIX - none

RELATED PROCEEDING APPENDIX - none